Letters

Omnibus Language Proposal

Most physical scientists, particularly graduate students, need the "dictionary-hunt" knowledge of two or three foreign languages, despite the contrary opinions and high costs cited by Nichols and Everson (Letters, 23 June). I have a suggestion that may seem bizarre at first; it is based on comments made by Fritz Zwicky at a symposium on Modern Methodology at Caltech recently. Briefly, Zwicky feels that languages can best be taught several at a time, as in his native Switzerland. He claims that in this manner, similarities and differences would stand out and be more easily remembered by students. Several of us urged him to prepare a textbook so that his idea could be tried, possibly in a special course for graduate students in the sciences.

No one seems to have given much thought to a course in "scientific languages," say, German, Russian, French, Italian and Spanish. A graduate student usually has had 2 years in one of these so that the comparative aspects of grammar would not be too difficult. As Zwicky points out, scientific terminology tends to be the same in most languages, and the student specializing in physics, for instance, is in any case helped by equations and diagrams. The purpose of such a course would be to give a student confidence in finding and reading articles in foreign journals about his own thesis topic, without spending the time to learn two or three languages thoroughly. The linguists will undoubtedly object to such shallow treatment, but they may be reassured that regular language courses will still be needed for other purposes, and that the five-language course may reduce the bored fringe of disinterested students in regular language classes. The major problem is who can teach such a course? (other than Zwicky)!

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Methanol: A New Fuel?

"Energy needs versus environmental pollution: a reconciliation?" (16 June, p. 1448) by Leon Green, Jr., proposed a system of energy generation based upon the use of ammonia as a fuel. The general thesis developed is attractive in that it provides for conversion of fossil fuels into a chemical fuel in such a way that waste products can be readily controlled and contained at the point of release. On the other hand, I think that Green's suggestions would have been much more practical if he had given consideration to the production of methanol rather than ammonia.

The chemical process used to convert fuel gas, petroleum fractions, or even coal to methanol is essentially the same as the process used for production of ammonia. In both, the original raw material is converted to a mixture of carbon monoxide and hydrogen which is then further processed to produce the desired final product. The efficiency of conversion is approximately the same in both cases, and a substantial fraction of the carbon originally present in the fossil fuel disappears from the system as carbon dioxide. In the case of ammonia, all of the carbon is separated in this manner; with methanol, about two-thirds is removed.

The cost of erected facilities for the production of ammonia or methanol are roughly comparable. Once very large plants are designed for producing methanol, the relative simplicity possible in handling the product as compared with the requirements for liquifying and pressurizing the ammonia product will probably result in an advantage in the overall investment cost. Methanol can be stored at atmospheric pressure under all normal conditions and can be readily shipped by pipeline, by normal tank car, or tank truck. Because of its very low freezing point and low viscosity, it can be used easily for all conventional fuel requirements.

It is interesting to note that, with some adjustment to the carburetor, methanol can be used as a fuel in ordinary internal combustion engines. It is a completely clean fuel requiring no additives, lead, or other constituents which tend to aggravate atmospheric pollution problems. Of course, it would be essential that the internal combustion engine be adjusted properly to avoid formation of oxygenated hydrocarbon compounds in the exhaust gases.

Of even more interest is the possibility of utilizing methanol directly as a fuel for a direct conversion fuel cell. Substantial work in this direction has been carried out at Institut Français du Pétrole where demonstration cells have already been built and operated for many thousands of hours. Use of methanol in this manner would permit a ready transition from hydrocarbon fuels inside of city areas with a gradual replacement of internal combustion engines by electric motors powered by fuel cells.

Production of methanol could be taken over completely by large energy companies currently refining petroleum and distributing hydrocarbon fuels. The investment required to produce enough methanol to replace all existing fuels would certainly be extremely high, but may not be out of proportion to that required for producing low-sulfur conventional fuels such as is being required by legislation currently being enacted throughout the country.

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Computer Science

Professors of computer science are often asked: "Is there such a thing as computer science, and if there is, what is it?" The questions have a simple answer:

Wherever there are phenomena, there can be a science to describe and explain those phenomena. Thus, the simplest (and correct) answer to "What is botany?" is, "Botany is the study of plants." And zoology is the study of animals, astronomy the study of stars, and so on. Phenomena breed sciences.

There are computers. Ergo, computer science is the study of computers. The phenomena surrounding computers are